Protective Oxide Coating for Ionic Conductive Solid Electrolyte Interphase

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**To employ Li-based batteries to their full potential in a wide range of energy-storage applications, their capacity and performance stability must be improved. Si is a viable anode material for Li-based batteries in electric vehicles due to its high theoretical capacity and good economic feasibility. However, it suffers from physical and chemical degradation, leading to unstable electrochemical performance and preventing its incorporation in new Li-based battery systems. Herein, we applied a poly(vinyl alcohol)-PO4 protective coating for Si-graphite anodes and confirmed an improvement in the electrochemical performance. The experimental results revealed that the polymer acts as a binder to alleviate the pulverization of the electrode. Furthermore, the oxide coating reduces the loss of Li2O, which has high ionic conductivity, during operation, resulting in the formation of a stable solid electrolyte interphase. Our findings suggest that a stable and ion-conducting anode/interphase can be developed by applying an oxide and polymer coating in combined approach. Therefore, this study is expected to provide a basis for the further development and design of high-performance Li-based battery systems.**